

These two claspers on the male thorax do not show any evidence of joints and are evidently simple modifications of the hypoderm of the segments on which they are located.

These claspers present certain arrangements of external sense organs which vary in the different species.

It may be that some of the readers of the Transactions will have a different theory of the origin of this structure and its nature; if so, we should much like to hear from them and get other facts bearing on the embryology of the organ.

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#### SUGGESTIONS FOR AMATEUR MICROSCOPISTS

1. *Whole Mounts*—Many interesting and beautiful specimens may be made from small insects, by steeping in concentrated carbolic acid solution, and mounting entire without compression. This agent is used especially to render transparent such subjects as acari and lice, parasites of birds, as it clears the outer skin and renders the internal organs visible. Crystallized carbolic acid liquified by heat, with the addition of 1 drachm of glycerine to 4 ounces of the melted carbolic acid, will not become solid again.

The acaridae or mites give interesting studies in color, form, and variety. For literature, see *Science Gossip*, or the monograph on the Oribatidae in the Ray Society by A. D. Michael.

2. *Internal Organs of Cockroach*—The members of the cockroach family can easily be obtained, and furnish interesting material. To kill, put a few drops of chloroform on blotting paper and cover together with animal. It is well to select some special and definite line of study,—as, say, the abdominal viscera,—after having studied the external parts.

To study the viscera of course requires dissection. The following suggestions will aid the beginner:

Remove all external appendages, as wings and legs, with scissors. To make a dissecting dish, take a piece of gutta percha, such as is supplied for boot soles, cut a piece  $4\frac{1}{2} \times 2\frac{1}{2}$  inches, soften in hot water, bend the edges so as to form a dish or pan. Drop into this a mixture of paraffin, white or blackened by lampblack, as preferred. Before this is entirely set the back of the insect may be

pressed gently on the surface. This will do away with the need of pins. When this is set cover with about 30-50% alcohol and dissect.

First remove the chitinous covering by shallow cuts along the side with fine pointed scissors. Don't injure organs within. Raise the skin gradually with forceps, beginning at the thoracic end, gently clearing away the attachments of the trachea with *new* steel or with gold plated needles. Rusty tools tear delicate tissues. The tracheae, the intestine and its outgrowths, the genitalia, etc., may thus be removed, stained as desired, and mounted in dilute glycerine, in which form it may be kept for extended examination.

If it is desired to study the nervous system the dissection should be made from the back instead of from the belly.

3. *Study of Variation*—There is much of value and interest to the general student in the study of the variation that occurs in corresponding organs in different animals. Take, for example, some peculiar glandular bodies found in the rectal pouch of various insects, known as the *rectal papillae*. These are connected with the function performed by the kidneys in higher animals,—excretion of uric acid. Well formed crystals are frequently found in the pouches. In the blow-fly they are 4 in number, of a pyramidal shape, projecting from the wall of the rectum. In the ear-wig there are 6 of the papillae which are of a circular shape; in the flea there are 6, but oval; in the bee they are 8 in number and elongated. The student will find, after once undertaking such comparative studies, an abundant field of interest open up to industry and intelligence.

4. *Using Newly Hatched Specimens*—Newly hatched insects are usually better than the older battered specimens for the study of many features. For example, the wings of butterflies are more beautiful and more representative if the animal is removed from the chrysalis before it has time to spread its wings. So the mouth parts of the blow-fly,—as the tongue,—can be handled and mounted more readily by the usual methods, when taken thus early, than by waiting until it is old and stiff.

A freshly hatched blow-fly, fed on a mixture of cochineal and sugar, will be found on dissection, to have its whole digestive tract

stained with carmine. Thus making more instructive and easy the dissection of it.

5. *To examine a living flea*—Insert a living flea under a tumbler, with some blotting paper on which are a few drops of chloroform. As soon as it becomes entirely still, fix it on a white card by laying its side in a minute drop of balsam or other transparent gum. When the effect of the anaesthetic has passed away the drying gum will hold the animal fast, and the motion of its legs and mouth parts may be studied. The problem is one of determining how long to allow the anaesthetic to act, and the rate of hardening of the gum.

6. *Non Rusting Needles*—Ordinary steel needles rust readily and corrode in various media. This can be prevented by coating them with gold. This may be done by shaking up an aqueous solution of gold chloride with sulphuric ether, which, taking up the gold from the solution, will deposit it on any steel which comes in contact with it. Surgeons' needles, especially those that are flat or triangular, if ground, sharpened and highly polished, are most useful instruments for minute dissection when gilded as above. Rusted implements will catch on delicate tissues, and often spoil one's preparations.

It is to be remembered that excellent needles for use in corroding reagents may be made by drawing out glass rods to the fineness of a needle point, over a spirit lamp.

7. *Simple life cell*—Take a slip of cork, such as is used for pinning insects in museums. Cut it the size of your microscopical slides. Make an oval hole, about  $1 \times \frac{3}{4}$  in. in diameter, thru the center, allowing the sides to taper slightly. Place the cork between glass slides, interposing a pad of wet blotting paper (with a corresponding hole in it) between the bottom slide and the cork. After placing the organisms within, the whole may be bound together by two elastic bands. Podurae and other small animals, not strictly aquatic, kept in these damp cells and fed on oatmeal, or other suitable food, will often thrive perfectly well, and may be studied at any moment. In this way extended studies of habits and life histories may be made. [From S. J. McIntire].

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